**REMARKS**

The above-identified application has been carefully reviewed in light of the Office Action mailed June 18, 2009, which included a final rejection of all claims presented.

Submitted herewith is a Request for Extension of Time, and required fee, extending the period for responding to the Office Action to and including October 18, 2009.

Submitted herewith is a Request for Continued Examination, and required fee. Applicant respectfully requests that this Request for Continued Examination be entered.

The specification, at page 24, first paragraph, has been amended to put into words that which was disclosed in Fig. 9 as originally filed. Thus, as shown in said Fig. 9, second surface 510 of heatspreader 500 is non-parallel or at a non-parallel angle to the opposing first surface 73 the layers of the chip. Since this amendment is fully supported by the application as originally filed, no new matter has been introduced.

Without conceding the correctness of the Examiner's rejections, and in order to facilitate obtaining an early allowance in the above-identified application, certain claim amendments have been made. Applicant expressly reserves the right to seek patent protection for the original claims and/or any other claims supported by the above-identified application in one or more later filed related applications.

Independent claims 1 and 32 have been amended to include the subject matter of claims 6, 7 and 15. Claims 1 and 32 have been amended to recite that the second surface of the heatspreader (in the alternative) is at a non-parallel angle to

the first surface of the heatspreader. Independent claim 25 has been amended to include the subject matter of claim 7.

Dependent claims 8, 9 and 17 have been amended to recite that the second surface of the heatspreader is curved or includes a curved surface.

Dependent claim 10, as well as claims 1, 25 and 32, have been amended to delete "a selected optical effect" and insert in place thereof --a selected optical function--.

The dependency of claim 12 has been changed.

Claims 2-7, 11 and 15 have been cancelled, without prejudice.

New claims 33-37 have been added and are directed to embodiments for which patent protection is sought.

Each of the claim amendments and new claims is fully supported by the application as filed. Therefore, no new matter has been introduced.

As noted above, the present claims have been amended to delete reference to "selected optical effect" and to substitute therefor --selected optical function--.

In view of this amendment, applicant submits that the present claims satisfy the requirements of 35 U.S.C. 112, first and second paragraphs. Therefore, applicant respectfully requests that the rejections of the present claims based on these statutory provisions be withdrawn.

The Examiner has rejected previous claims 1, 6, 10, 11, 20-22, 25, 29, 30 and 32 under 35 U.S.C. 102(b) as allegedly being anticipated by Zheng; previous claims 2 and 3 under 35 U.S.C. 103(a) as allegedly being unpatentable over Zheng in view of Chang et al; previous claim 5 under 35 U.S.C. 103(a) as

allegedly being unpatentable over Zheng; previous claims 8 and 17 under 35 U.S.C. 103(a) as allegedly being unpatentable over Zheng in view of Raymond et al; previous claims 12-14 under 35 U.S.C. 103(a) as allegedly being unpatentable over Zheng; previous claim 23 under 35 U.S.C. 103(a) as allegedly being unpatentable over Zheng; and previous claim 31 under 35 U.S.C. 103(a) as allegedly being unpatentable over Zheng in view of Yoshida et al.

Since, as noted above, each of the present independent claims include the subject matter of previous claim 7 and/or claim 15, and since none of the above-noted rejections are directed to either claim 7 or claim 15, applicant submits that each of the above-noted rejections is moot with regard to the present claims.

Claims 7, 9, 16, 18, and 19 and 26-28 have been rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Zheng. Claim 15 has been rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Zheng. Applicant traverses each of these rejections as it pertains to the present claims 1, 8-10, 12-14, and 16-37.

Zheng describes a vertical-cavity surface emitting laser (VCSEL) having a heatspreader of the broad type known in the prior art and acknowledged in the present patent application, namely a transparent intracavity heatsink (above-identified application, paragraph [0019]). The Zheng heatsink performs the function that any heatsink or heatspreader must perform in a VCSEL: it removes heat from the active layer of the device. As acknowledged in paragraph [0027] of the above-identified patent

application, the thermal properties of a heatspreader can drastically improve output performance.

As noted above, independent claim 1 has been amended to include the features of previous claims 6, 7 and 15; independent claim 25 has been amended to include the feature of previous claim 7; and independent claim 32 has been amended to include the features of previous claims 6, 7 and 15.

Thus, independent claims 1 and 32 are now directed to a vertical cavity device in which the second surface of the heatspreader is curved or includes a curved structure or is at a non-parallel angle to the (opposite) first surface of the heatspreader, so that the heatspreader, in addition to removing heat from the active layer is of a shape that provides a selected optical function on light output from the device. Independent claim 25 is now directed to a method of manufacturing a vertical-cavity device in which the second surface of the heatspreader is curved or includes a curved structure so that the heatspreader is of a shape that provides a selected optical function in addition to the effect of removing heat from the active layer.

The present claims are directed to vertical cavity devices and methods of manufacturing vertical cavity devices including heatspreaders having different and distinct (relative to the prior art) shapes which provide selected optical functions on the output light (as discussed hereinafter) in addition to removing heat from the active layer.

Importantly, the shape of a heatspreader is a structural feature of the heatspreader, in contrast to the dimensions of a heatspreader, which denote differences in size, not structure.

Previous claim 7 was rejected under 35 U.S.C. 103(a) as being obvious over Zheng. The Office Action states that:

> "Zheng discloses the claimed invention except for second surface of the heatspreader is curved or includes a curves structure and the heatspreader has a shape selected to provide control of a spatial mode of the output light. Notwithstanding, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical." (Emphasis added)

The Supreme Court's decision in *KSR International Co. v. Teleflex Inc.*, 500 U.S. 398, 82 U.S.P.Q.2d 1385 (2007), does not endorse rejections for obviousness that are based on no evidence or on pure speculation. The Supreme Court quotes with approval the statement in *In re Kahn, 441 F. 3d 977,988 (CA Fed. 2006)* that "there must be some articulated reasoning with **some rational underpinning** to support the legal conclusion of obviousness" (emphasis added). The assertion noted above made

in the Office Action is factually incorrect, wholly speculative and presents no evidence to support it.

Indeed, the rejection appears misdirected in that it refers to the heatspreader having a second surface which is curved or includes a curved structure as being a mere dimensional limitation. To the contrary, as noted above, the present curved/curved structure (of the second surface of the heatspreader) recitations in the present claims provide the heatspreader with a shape that provides a selected optical function on light output from the device. As noted above, shape is a structural feature of an object (the heatspreader) and is not a dimensional limitation(in contrast to, for example, size).

Applicant vigorously disagrees with the unsupported assertion in the Office Action that it would have been an obvious matter of design choice to provide a device with a heatspreader having a curved second surface. To the contrary, applicant submits that to move from the prior-art heatspreader structure of a cuboidal heatspreader to the claimed heatspreader - in which the second surface of the heatspreader is curved or includes a curved structure so that the heatspreader, in addition to removing heat from the active layer, is of a shape that provides a selected optical function on light output from the device is a fundamental change in the structure of the heatspreader and the presently claimed vertical cavity devices.

In addition, applicant vigorously disagrees with the assertion in the Office Action that the "Applicant has not disclosed that the dimensions [*sic*] are for a particular unobvious purpose, produced an unexpected result, or are otherwise critical". To the contrary, the above-identified

application, as filed, discusses the advantages of the presently claimed structures in some detail. See, for example, Paragraphs [0102]-[0107] of the U.S. Publication of the above-identified application U.S. Pat. Pub. 2008/0043798 A1).

Previous Claim 15 was rejected under 35 U.S.C. 103(a) as being obvious over Zheng. The Office Action states that:

> "Zheng discloses the claimed invention except for second surface of the heatspreader is at an angle to the layers of the chip. It would have been obvious to one having ordinary skill in the art at the time the invention was made to second surface of the heatspreader can has any type of angle (e.g. 90° degrees or 147 ° degrees), since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art...
>
> In addition, the selection of second surface of the heatspreader it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range...
>
> Note that the specification contains no disclosure of either the critical nature of the claimed [second surface of the heatspreader is at an angle to the layers of the chip] or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen [second surface of the heatspreader is at an angle to the

layers of the chip] or upon another variable recited in a claim, the Applicant must show that the chosen [second surface of the heatspreader is at an angle to the layers of the chip] are critical."

Again, the Office Action fails to follow the approach approved by the Supreme Court in *KSR International Co. v. Teleflex Inc.*, supra. In particular, the Office Action asserts that it would be obvious to one skilled in the art that the second surface of the heatspreader can have any angle e.g. 90 degrees or 147 degrees. However, applicant submits that, based on the prior art, it would not have been obvious to go from the cuboidal 90 degree shape of a prior art heatspreader to a heatspreader in which the second surface is at, to use the example given in the Office Action, 147 degrees. Providing the second surface of the heatspreader at a non-parallel angle to the (opposite) first surface of the heatspreader, as recited in the present claims, is not merely a question of "discovering the optimum or workable ranges", but is a qualitative change in the shape (structure) of the heatspreader.

As the Examiner will appreciate, right angles are a special kind of angle. A square is qualitatively different in structure from a trapezoid, in a way in which one trapezoid with a corner of 147 degrees is not qualitatively different from a trapezoid with a corner of 158 degrees. The former (square versus trapezoid) is between different classes of shapes: one is a square, the other a trapezoid; the latter (two trapezoids at different angles) is merely a difference between two trapezoids.

In the present situation, providing the second surface of the heatspreader at a non-parallel angle to the first (opposite) surface of the heatspreader is a substantial qualitative change in the shape (structure) of the heatspreader, akin to moving from a square to a trapezoid.

In view of the above, applicant submits that the Office Action is mistaken in its reference to "ranges". The "non-parallel angle" structure of the heatspreader, recited in the present claims, is not a selection from a range of prior-art heatspreader shapes. No relevant range is taught or even suggested in the prior art. For example, in each of the heatspreaders described in the cited documents, for example, Zheng, the second surface of the heatspreader is parallel to the first surface. At least to this extent, the cited documents teach clearly, directly and expressly away from the present claims.

Although presented in terms of case law relating to ranges, which the applicant submits is inappropriate in respect of the "non-parallel angle" structural feature in question, the Office Action also appears to be asserting that the specification contains no disclosure of this claim feature providing an advantage. Applicant vigorously disagrees. For example, this structural feature is discussed in some detail in the above-identified application. See, for example, the first full paragraph on page 24 of the present specification.

In summary, the cited documents, for example, Zheng, do not disclose, teach or even suggest a vertical cavity device or a method of manufacturing a vertical cavity device including a heatspreader having the structural features of claim 1, 25 and

32, as presently amended, in particular the feature of the second surface of the heatspreader being curved or including a curved structure or being at a non-parallel angle to the first surface of the heatspreader so that the heatspreader, in addition to removing heat from the active layer, is of a shape that provides a selected optical function on light output from the device. Provision of those features is not merely a workshop variation, or selection from a prior art range, but rather results in a wholly new class of heatspreaders which are structurally different from and have advantageous properties in comparison with prior art heatspreaders.

Moreover, the features identified by the Examiner are merely the standard features of any heatspreader. For example, a person of ordinary skill in the art would recognize that providing a heatspreader will usually have the effect of achieving a temperature distribution that is more uniform than it would be if no heatspreader were present. A heatspreader will usually have a higher conductivity than the active layer from which it removes heat, so excess heat from any hotter parts of the active layer will quickly be removed, tending to make the temperature distribution in the active region more uniform. But that is merely a manifestation of the primary function of a heatspreader: spreading heat by removing heat from the active layer. It is a thermal effect or function.

Zheng therefore does not disclose, teach or suggest the present claims, for example, vertical cavity devices and methods of manufacturing vertical cavity devices including a heatspreader structured as recited in the present claims and having a selected optical function, in addition to the heat-

removing function of a heatspreader, as recited in the present claims.

Therefore, applicant respectfully submits that all of the present claims, that is claims 1, 8-10, 12-14 and 16-37, are unobvious from and patentable over Zheng under 35 U.S.C. 103(a).

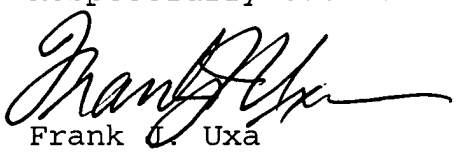
Each of the present dependent claims is separately patentable over the prior art. For example, none of the prior art, taken singly or in any combination, disclose, teach or even suggest the present devices and methods including the additional feature or features recited in any of the present dependent claims. Therefore, applicant submits that each of the present claims is separately patentable over the prior art.

In conclusion, applicant has shown that the present claims are unobvious from and patentable over the prior art under 35 U.S.C. 103(a). Therefore, applicant submits that the present claims, that is claims 1, 8-10, 12-14 and 16-37, are allowable and respectfully requests the Examiner to pass the above-identified application to issuance at an early date.

Before taking any action adverse to the applicant, the Examiner is respectfully requested to call applicant's attorney

at the telephone number given below to set up a telephonic interview in the above-identified application.

Respectfully submitted,



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